



# Teaching CCNA Security at NMMU

Gratitude Kudyachete – SSA CATC Manager

# Agenda

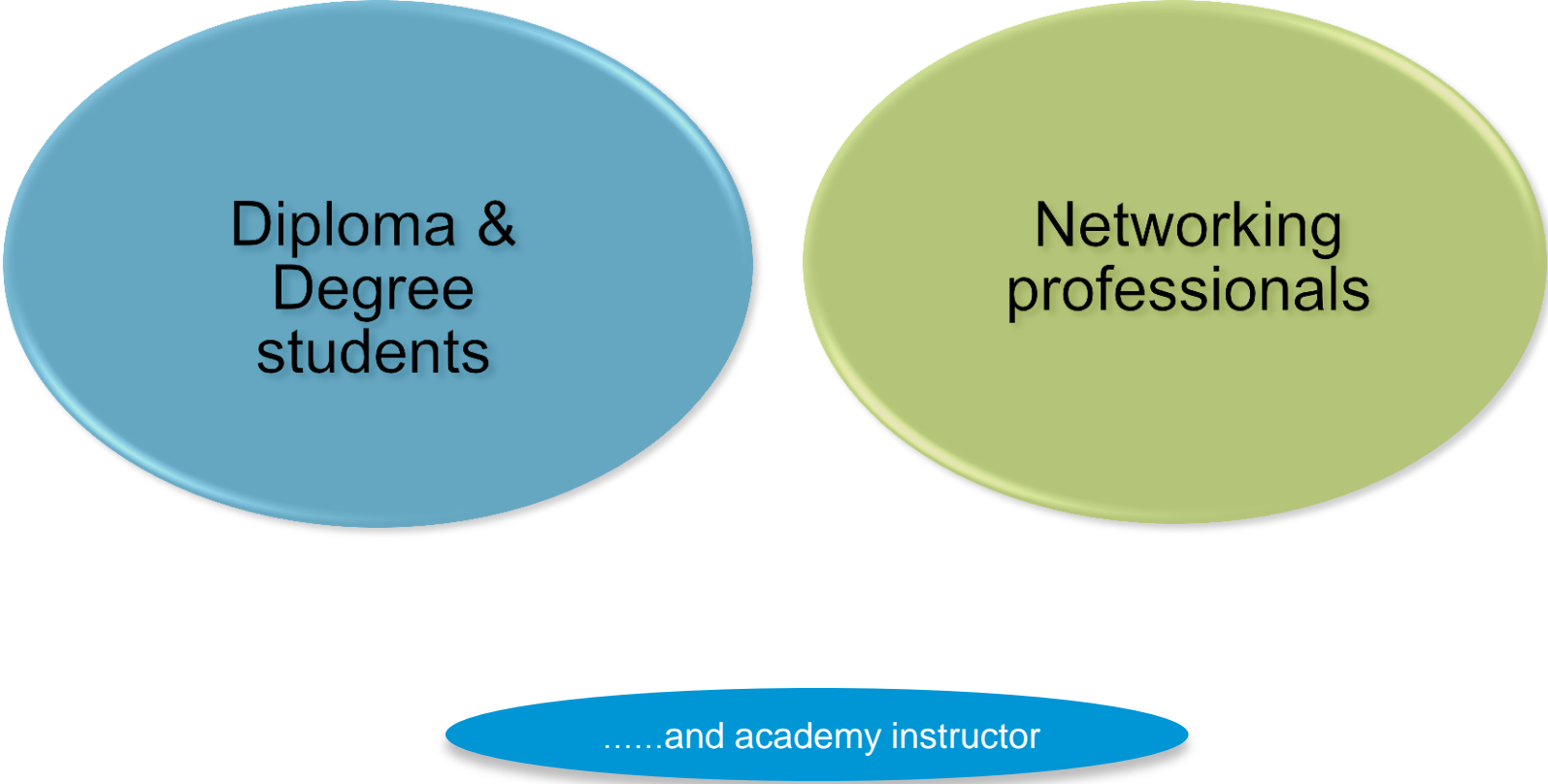
What is our market?

Programme Structure

Teaching Specific Chapters

What is our market?

# What is the market for CCNA S ?



Diploma &  
Degree  
students

Networking  
professionals

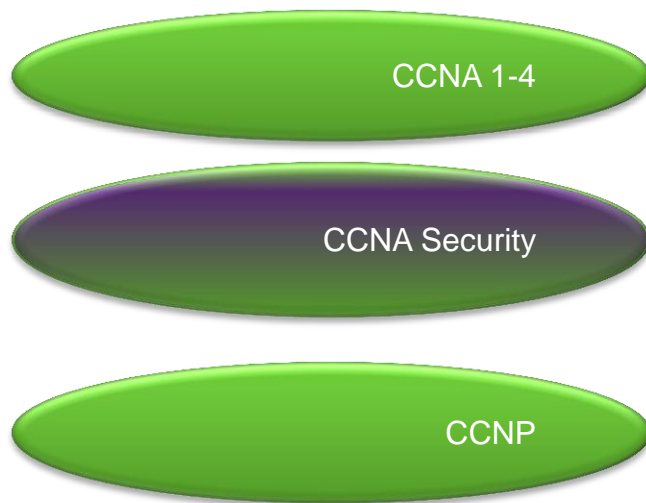
.....and academy instructor

# Programme Structure

# Communication Networks(Full-time)

➤ 1 <sup>st</sup> Year	➤ 2 <sup>nd</sup> Year	➤ 3 <sup>rd</sup> Year	➤ 4 <sup>th</sup> Year
<p><u>System IT Principles</u> (Y)</p> <p>➤ IT Ess 1</p> <p>➤ CCNA 1</p>	<p><u>Distributed Systems II (Y)</u></p> <p>Basic OS theory, advanced low level programming, OS integration in distributed environment, Linux and Shell programming</p>	<p><u>Distributed Systems III</u></p> <p><b>Network OS III (S1)</b></p> <p>NOS installation, configuration and maintenance, designing enterprise wide server architectures</p> <p><b>Project III (S2)</b></p>	<p><u>IT Management</u> (Y)</p> <p>➤ CCNP:Sw (S1)</p> <p>➤ Advanced Security (S2)</p>
<p><u>Information Systems I (Y)</u></p> <p>Fundamentals of info systems, intro to system analysis and design, end user computing, MS Office apps, application of database theory in MS Access</p>	<p><u>IT Electronics II</u></p> <p><b>Digital Systems I (S1)</b></p> <p>Basic electronic devices, principles of circuit design</p> <p><b>Mathematics (S2)</b></p> <p>Problem solving techniques, discrete maths</p>	<p><u>IT Electronics III</u></p> <p><b>Digital systems II (S1)</b></p> <p>Shift registers, memories, integrated circuit technologies</p> <p><b>Digital Systems III (S2)</b></p> <p>Microprocessors, micro controllers</p>	<p><u>Computer Networks</u> (Y)</p> <p>➤ CCNP :Tshoot (S1)</p> <p>Network optimisation, advanced troubleshooting</p> <p><b>Project IV (Y)</b></p>
<p><u>Dev. Software I (Y)</u></p> <p>C#, problem solving, programming concepts, error handling, debugging</p>	<p><u>Dev. Software II (Y)</u></p> <p>C#, object-oriented programming, advanced OOP, component programming, data structures, elaboration of .NET framework</p>	<p><u>Support Services II</u></p> <p>Legal, ethical and professional issues in Info Security, risk management and security planning</p>	<p><b>Research Method IV (S1)</b></p> <p>Research process, methods, techniques</p> <p><b>OS IV (S2)</b></p> <p>OS, middleware, Linux, PHP</p>
<p><u>Information Technology Skills I (Y)</u></p> <p>Stress management</p> <p>Conflict resolution</p> <p>Demonstrate appropriate behaviour to user needs</p>	<p>➤ CCNA 2</p> <p>➤ CCNA 3</p> <p>➤ CCNA 4</p>	<p>➤ CCNA Security (S1)</p> <p>➤ CCNP:Route (S2)</p>	<p><b>Info Security IV (S1)</b></p> <p>Std's, regulations, management</p> <p><b>Support Services IV (S2)</b></p> <p>Incident response, disaster recovery, crisis management</p>

# Part-time



Replace 4<sup>th</sup>  
CCNP Module

# Duration

70 Hour Course

One semester long

More demanding than other semester long courses

- N.B. our instructor training is also a day longer



# CCNA Security Prerequisites

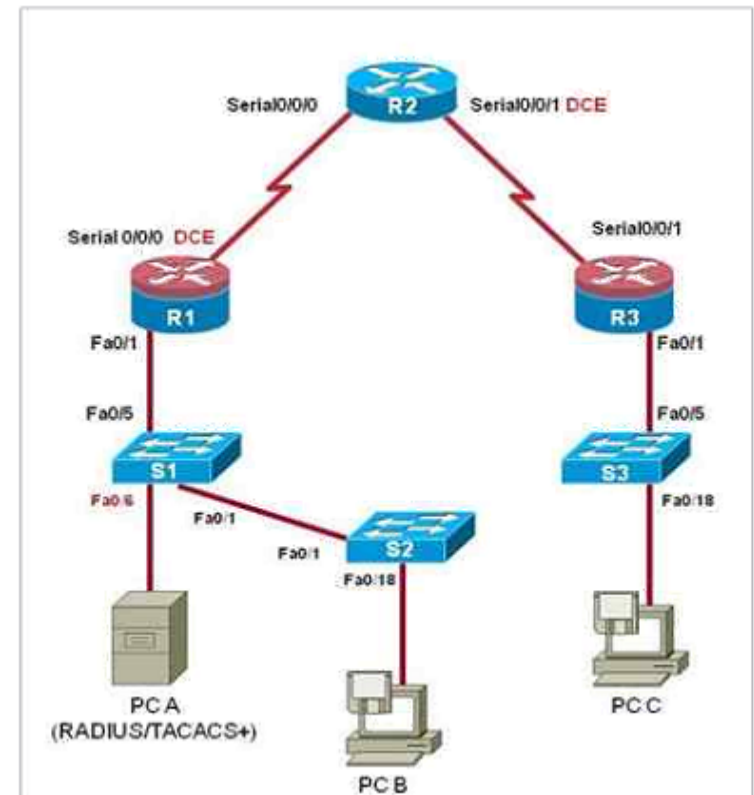
- ❖ No prerequisites but Cisco recommends
  - ✓ Basic PC Skills
  - ✓ Internet Navigation Skills
  - ✓ CCNA level networking knowledge
- ❖ Our practical approach is to insist on CCNA level knowledge

# Delivery mode

- 100% In person (for part-time & fulltime programmes)
  - Conventional classroom learning
  - Instructor led training – online curriculum, hands-on practicals
  - Formal & informal assessments
- BDL -
  - Only for instructor training
  - Blend of Webex & self-paced learning
  - Online curriculum and remote access to Netlab
  - Formal & informal assessments
  - Duration 7 weeks

# Equipment

Description	Mfr.	Part Number	Qty.
Modular Router w/2xFE, 2 WAN slots, 32 FL/128 DR	Cisco	CISCO1841	3
128 to 192MB SODIMM DRAM factory upgrade for the Cisco 1841	Cisco	MEM1841-64D	2
64MB Cisco 1800 Compact Flash Memory	Cisco	MEM1800-64CF	2
2-Port Async/Sync Serial WAN Interface Card	Cisco	WIC-2A/S or WIC-2T	3
V.35 Cable, DTE Male to Smart Serial, 10 Feet	Cisco	CAB-SS-V35MT	2
V.35 Cable, DCE Female to Smart Serial, 10 Feet	Cisco	CAB-SS-V35FC	2
Catalyst 2960 24 10/100 + 2 1000BT LAN Base Image	Cisco	WS-C2960-24TT-L	3
(Optional) Rackmount Kit for the 1841	Cisco	ACS-1841-RM-19	3
Cisco IOS Release 12.4(20)T1 Advanced IP Services	Cisco	c1841-advipservicesk9-mz.124-20.T1.bin	2



➤ Typical Student to equipment ratio is about 2:1

## Teaching Specific Chapters

# Teaching Approaches

- How to teach Chapter 1
- How to teach Chapter 8

# Chapter 1 - Modern Network Security Threats

- Key Concepts
  - ❖ Principles of network security; confidentiality, integrity, and availability
  - ❖ The security management model
  - ❖ The principles of network risk assessment, risk management, threats, vulnerabilities, and countermeasures
  - ❖ Methodology of a structured attack
  - ❖ Security policies, standards, procedures and guidelines
  - ❖ Selecting and implementing countermeasures

# Teaching Chapter 1

- Major Task is to make the course relevant



Relevance

Attack Tools

Security  
Organization  
s

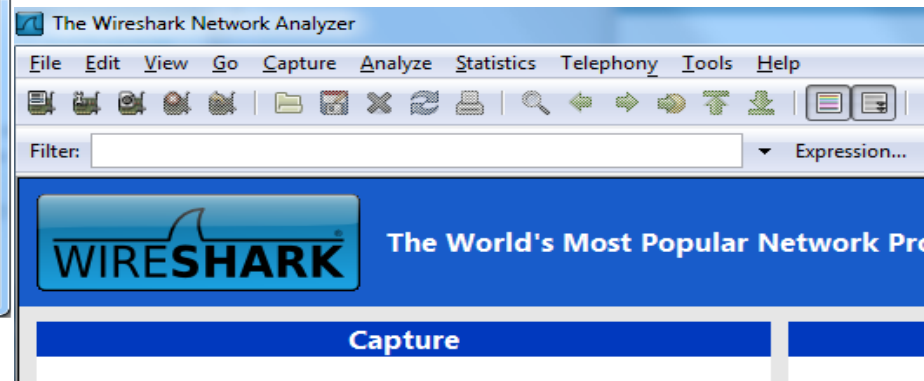
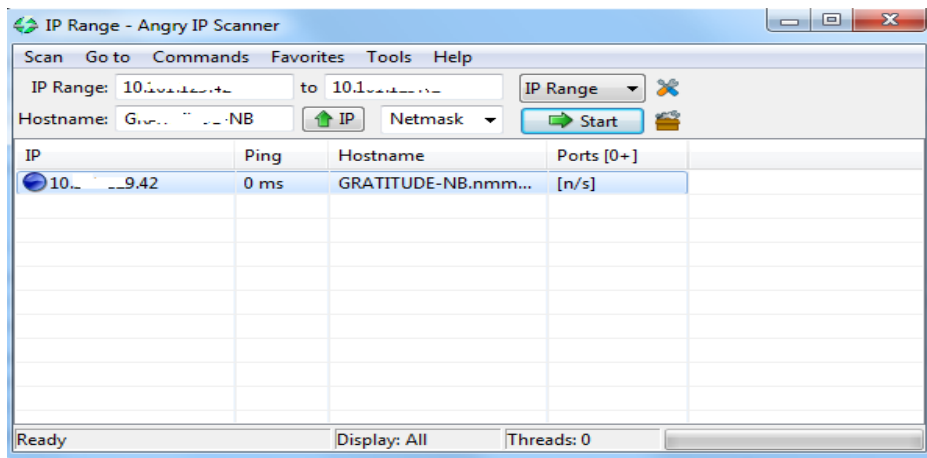
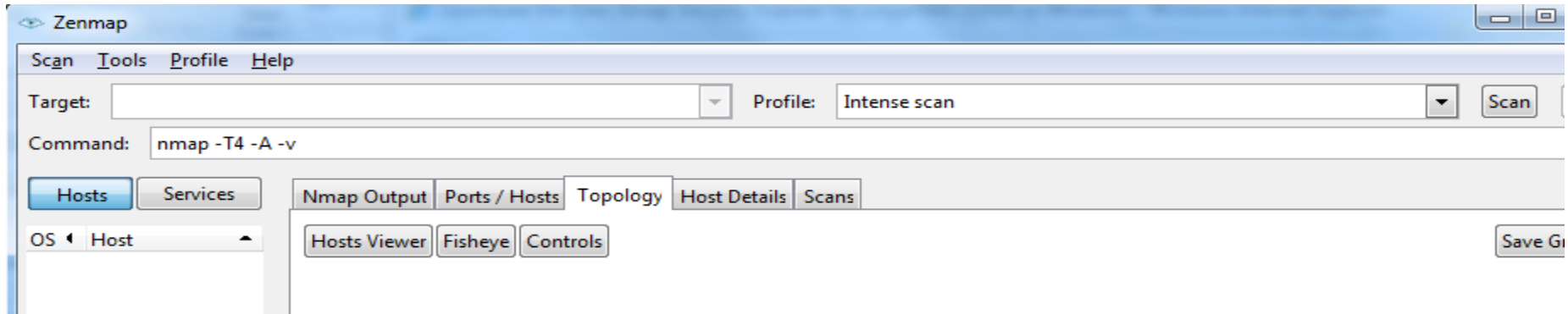
Breakout  
sessions &  
research  
activities

# Teaching CCN S – Chapter 1

- Get Students to know [Wireshark](#) as a packet sniffer
- Demonstrate one or more of the following:
  - Enumeration tools (dumpreg, netview and netuser)
  - [Port/address scanners](#) (AngryIP, [nmap](#), Nessus)
  - [Vulnerability scanners](#) (Meta Sploit, Core Impact, ISS)
  - Packet Sniffers (Snort, Air Magnet)
  - [Root kits](#)
  - [Cryptographic cracking tools](#) (Cain, WepCrack)



# CCNA S - Attacker Tools



# Teaching Chapter 1

- Have student breakout sessions and analyze:
  - ✓ Physical risk to a person
  - ✓ Risk of natural disasters
  - ✓ Risk of equipment failure
  - ✓ Risk of fraud, vandalism, and other planned attacks
  - ✓ Let them perform calculations about risk e.g. EF,ARO,ALE
- Make lab 1 mandatory – Researching Network Attacks + Security Audit tools
- Discuss the findings from lab 1

# Teaching Chapter 1

- Get Students to be familiar with Security organizations
- Read some of the security information off these organizations

➤ [www.infosyssec.com](http://www.infosyssec.com)

➤ [www.sans.org](http://www.sans.org)

➤ [www.cisecurity.org](http://www.cisecurity.org)

➤ [www.cert.org](http://www.cert.org)

➤ [www.isc2.org](http://www.isc2.org)

➤ [www.first.org](http://www.first.org)



Forum of Incident Response and Security Teams



# Teaching Chapter 8

- Key concepts
  - Describe the purpose and operation of GRE VPNs.
  - Components and operations of IPSec VPNs.
  - A site-to-site VPN and how it interconnects two sites
  - A remote-access VPN and how it allows a user, with software on the client computer to connect to a centralized VPN termination device.
  - Configure and verify a Remote Access VPN.
  - Secure Socket Layer (SSL) and its use in a remote-access VPN

# Chapter 8

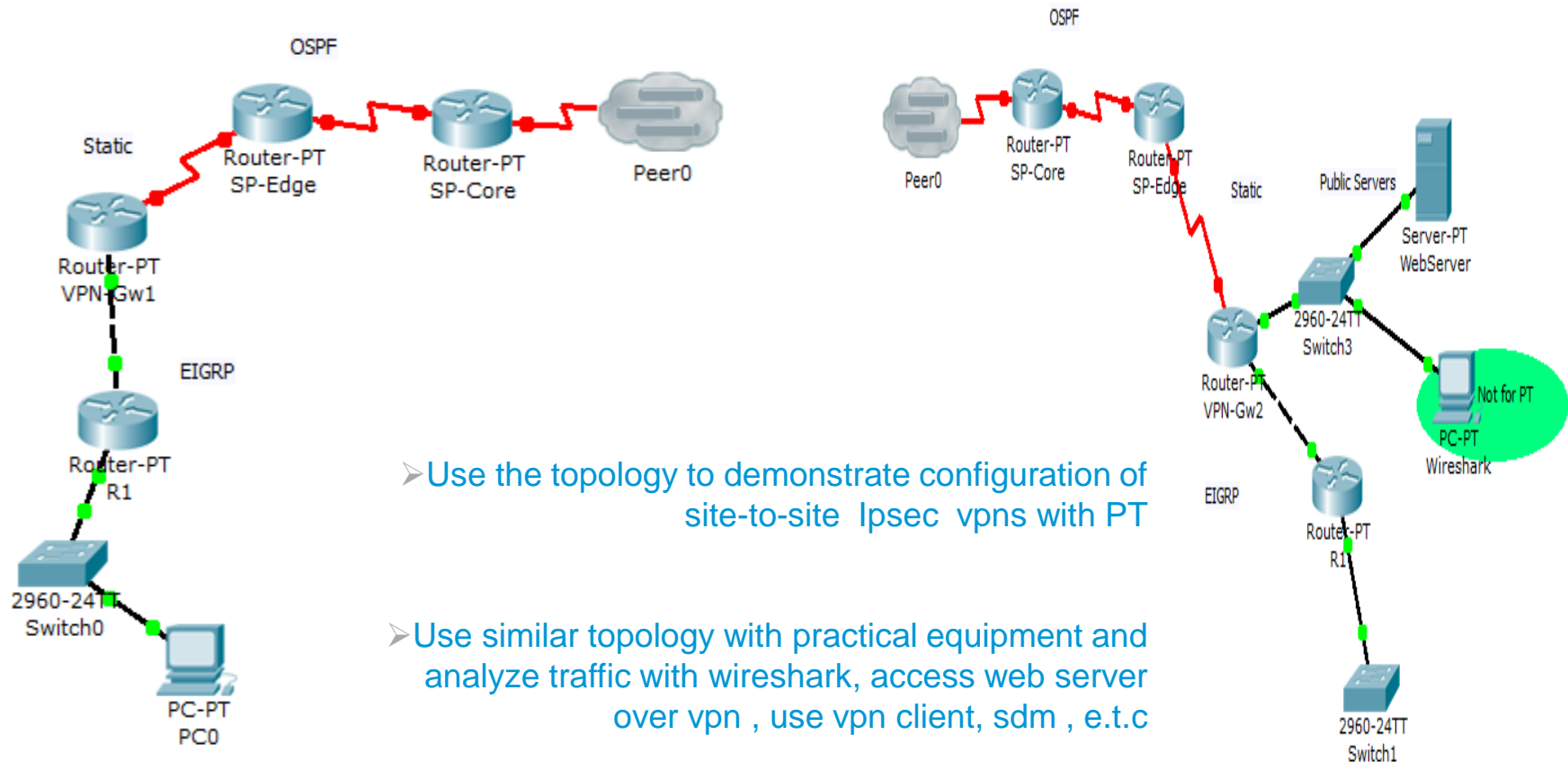
## ❖ Before teaching Chapter 8

- Give students this chapter as a reading assignment
- Make sure that preceding chapters and concepts have been understood
- In particular Chapter 7 + Lab on Encryption Methods
- Chapter 5 – Firewall Technologies ( its longer than most of the other chapters)
- Have PT & SDM ready

# Teaching Chapter 8

- Introduce topic with the video
  - Cisco IOS Easy VPN Video Data Sheet ( 4 ½ minutes)
- To illustrate encapsulation, one can start with overlay networks – TDM over Metro Ethernet , IPv6 over IPv4 e.t.c
- Employ Packet tracer - an elaborate diagram to prove that one is **really** going through a big network such as the internet
- Make use of Wireshark to demonstrate packet protection
- The topic should be covered for **more than one** day no matter the contact hours per day

# Chapter 1 – PT Diagram



# Discussion Activities

- ❖ Break Students into groups, ask each to research on one of the many types of VPNs covered in the course
- ❖ Alternatively have the students write a 3-minute paper that compares/contrasts the following types of VPN's:
  - IPsec transport mode
  - IPsec tunnel mode
  - SSL



# Lessons

- The content from Cisco is rich , and concepts are many
- For many students the learning curve is steep
- The scene needs to be properly set in the introductory chapter
- A lot of demonstrations should be done by the instructor
- Students need to be fully engaged through a variety of activities – labs, discussions, research activities
- Make it interactive

# Thank You!